

**UTAH DIVISION OF OIL, GAS AND MINING
STATE DECISION DOCUMENT AND
TECHNICAL ANALYSIS**

**Intermountain Power Agency
Horse Canyon Mine
Permit
ACT/007/013
May 6, 1991**

CONTENTS

- * Administrative Overview
- * Location Map
- * Permitting Chronology
- * Findings
- * State Permit
- * Technical Analysis
- * Cumulative Hydrologic Impact Assessment (CHIA)
- * Affidavit of Publication
- * Reclamation and Bonding Agreement

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ADMINISTRATIVE OVERVIEW

Intermountain Power Agency Horse Canyon Mine ACT/007/013

**Carbon and Emery Counties, Utah
May 6, 1991**

Horse Canyon Mine is an inactive underground coal mine located in Emery and Carbon Counties, Utah, within the Book Cliffs Coal Field, about 120 miles southeast of Salt Lake City. The mine was initially opened by the Defense Plant Corporation in 1942 as the source of metallurgical grade coal for the Geneva Steel Works in Orem, Utah. The mine was sold to U.S. Steel in 1946, who operated the mine until January 1984, when all mining was permanently suspended.

U.S. Steel submitted a permanent program mining and reclamation plan permit application on March 17, 1981 for the operations existing at that time consisting of 3,120 acres of underground mine workings and approximately 87 acres of surface disturbances. On October 15, 1982, U.S. Steel informed the Division of Oil, Gas and Mining (Division) that it was temporarily suspending mining operations at the Horse Canyon (Geneva) Mine. U.S. Steel informed the Division of its plans to permanently suspend mining operations in January 1984.

On November 11, 1984, Kaiser Steel Corporation purchased the Horse Canyon Mine property from U.S. Steel, submitted a permanent program reclamation bond in the amount of \$918,649, and indicated to the Division that it would maintain the operations in a temporary suspension status pending further corporate decisions as to the future use of the facilities.

However, On February 13, 1987, Kaiser Coal (successor in interest to Kaiser Steel) filed a petition for bankruptcy under Chapter 11, Title 11, of the U.S. Bankruptcy Code. Revised reclamation plans submitted by Kaiser Coal's bankruptcy estate on February 24, 1987 and May 29, 1987 were determined by the Division to be incomplete. On February 2, 1990, Kaiser Coal's bankruptcy estate submitted a revised application which was accepted by the Division as a complete maintenance and reclamation plan with certain technical deficiencies. On April 5, 1990, Intermountain Power Agency acquired the Horse Canyon Mine and on April 6, 1990, Intermountain Power Agency submitted an application with the Division to assign Kaiser Coal's permit rights and pending application. The Division conditionally approved transfer to Intermountain Power Agency upon posting a bond or other surety to secure reclamation obligations. Intermountain Power Agency submitted a letter of credit in the amount of \$1,359,000 on July 2, 1990 to secure reclamation obligations at Horse Canyon Mine.

Page 2
Administrative Overview
ACT/007/013
May 6, 1991

On July 6, 1990, the Division and Intermountain Power Agency agreed to a schedule of permitting and reclamation activities at the Horse Canyon Mine. This schedule was approved by the Office of Surface Mining (OSM) by letter dated July 27, 1990. In a letter dated August 10, 1990, the Division approved transfer of Kaiser Coal's permit rights to Intermountain Power Agency.

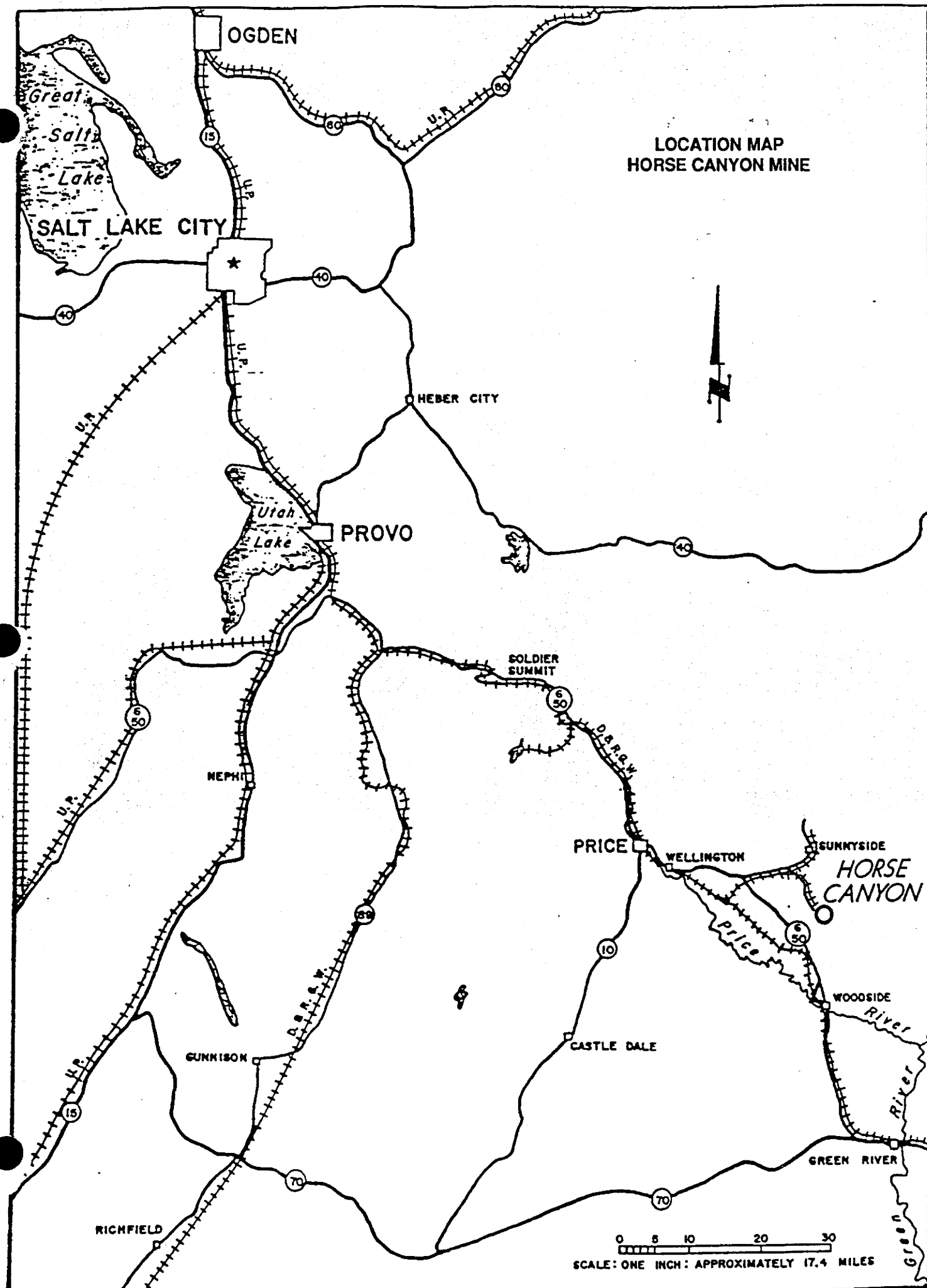
The applicant published notice for the permanent program permit for four consecutive weeks, ending on November 27, 1990. No comments were received.

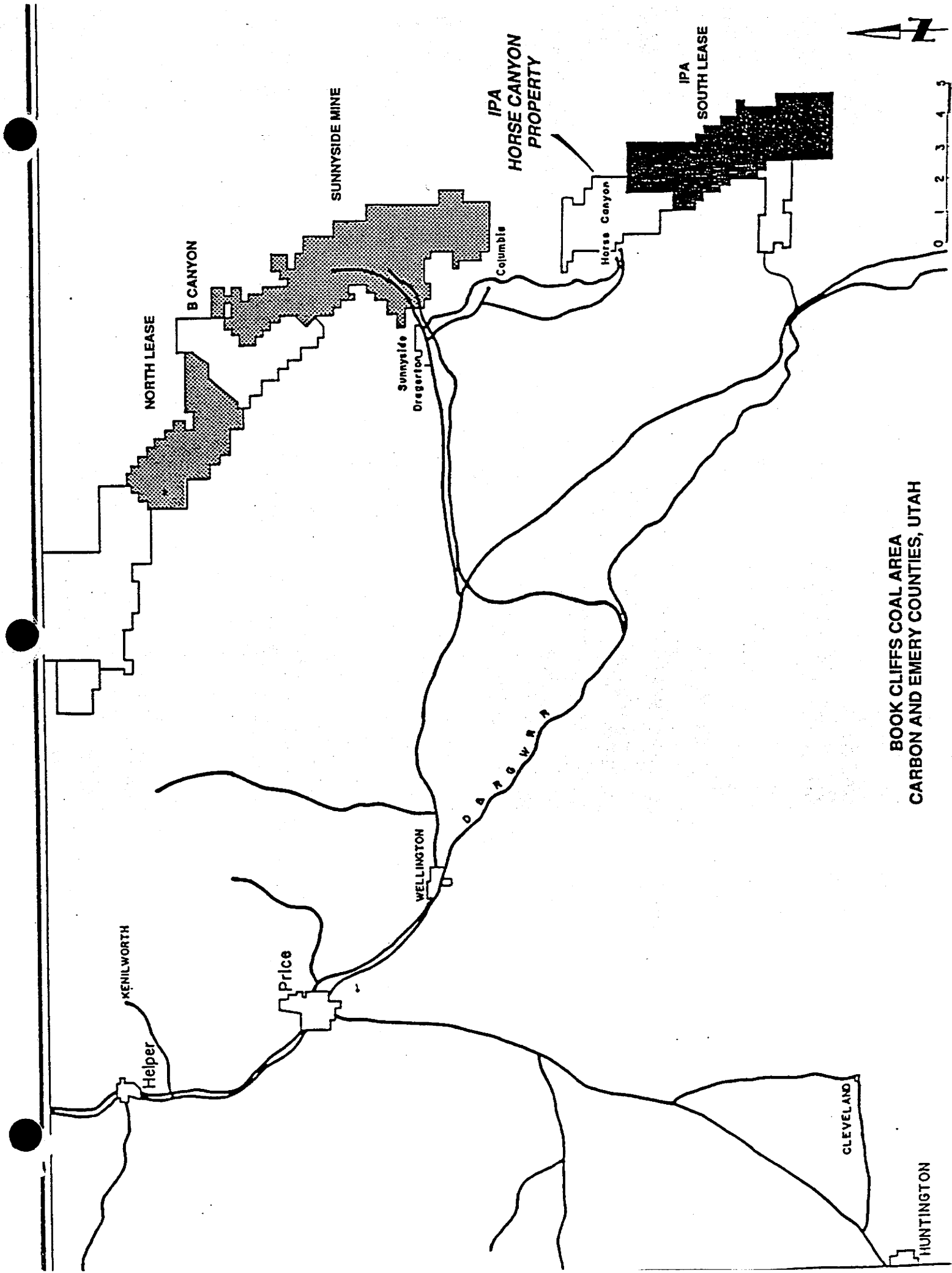
Recommendation for Approval

Approval of the permanent program permit is recommended based upon the review of the Permit Application Package.

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LOCATION MAP
HORSE CANYON MINE





BOOK CLIFFS COAL AREA
CARBON AND EMERY COUNTIES, UTAH

**CHRONOLOGY
INTERMOUNTAIN POWER AGENCY
HORSE CANYON MINE
ACT/007/013**

PERMIT

April 5, 1990	Intermountain Power Agency (IPA) acquires Horse Canyon Mine.
August 15, 1990	Intermountain Power Agency submits Permit Application Package (PAP) for Horse Canyon Mine.
September 26, 1990	Division issues Initial Completeness Review (ICR) and Technical Deficiencies (TD).
October 19, 1990	Intermountain Power Agency submits response to ICR.
November 1, 1990	Division issues Determination of Completeness. Intermountain Power Agency initiates public notice for four consecutive weeks.
November 30, 1990	Intermountain Power Agency responds to Technical Deficiencies.
January 11, 1991	Technical Deficiencies document is issued to Intermountain Power Agency.
February 8 & 22, 1991	Intermountain Power Agency responds to Technical Deficiencies.
March 15, 1991	Technical Deficiencies document is issued to Intermountain Power Agency.
April 1 & 29, 1991	Intermountain Power Agency responds to Technical Deficiencies.
May 6, 1991	State Permit Issued.

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Norman H. Bangerter
Governor

Dee C. Hansen
Executive Director

Dianne R. Nielson, Ph.D.
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340

May 6, 1991

TO: Pamela Grubaugh-Littig, Permit Supervisor *pgl*

FROM: Joseph C. Helfrich, Regulatory Program Coordinator *jd*

RE: Compliance Review for Section 510(c) Findings, Intermountain Power Agency, Horse Canyon Mine, ACT/007/013, Folder #5, Emery County, Utah

As of the writing of this letter, there are no NOV's or CO's which are not corrected or in the process of being corrected. Any NOV's or CO's that are outstanding are in the process of administrative or judicial review. There are no finalized Civil Penalties which are outstanding and overdue in the name of Intermountain Power Agency.

Finally, they do not have a demonstrated pattern of willful violations, nor have they been subject to any bond forfeitures for any operation in the state of Utah.

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DATE: 07 MAY 91

APPLICANT VIOLATOR SYSTEM
APPLICATION EVALUATION REPORT

TIME: 11:01:13

TE: UT

APPNO: ACT007013

SEQNO: 0

PAGE: 1

APPLICANT'S ENTITY ID: 119705

APPLICANT'S NAME : INTERMOUNTAIN POWER AGENCY

SYSTEM RECOMMENDATION IS BASED ON ENTITY OFT

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* SYSTEM RECOMMENDATION : ISSUE *
* PREVIOUS SYSTEM RECOMMENDATION: ISSUE(910507) *
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F2/PROCEED F3/QUIT F4/MAIN F6/REPORT F9/V.VIOL F10/V.OFT

**HORSE CANYON MINE
INTERMOUNTAIN POWER AGENCY
TECHNICAL ANALYSIS
ACT/007/013**

**Carbon County, Utah
May 6, 1991**

R614-301-100 GENERAL CONTENTS (SW)

112. Identification of Interests. The permit applicant and operator for the Horse Canyon Mine is the Intermountain Power Agency (IPA). IPA is a political subdivision of the State of Utah. Denise Dragoo with Fabian and Clendenin is the resident agent who will accept service of process (page I-11). The name and address of IPA officers and directors are on page I-12. The applicant has not previously operated any coal mining operations within the five years preceding date of application. The owners of surface lands are listed on page I-8, contiguous surface owners on page I-13 and coal ownership on page I-9. The holder of a leasehold interest is shown on page I-10. The Horse Canyon Mine MSHA number is given on page I-14. There are no outstanding interests for lands contiguous to the permit area.

113. Violation Information. The applicant nor any affiliate has neither a permit revoked nor forfeited any mining bond (page I-16). A list of violations descriptions and status are on page I-16.

114. Right-of-Entry Information. A copy of the Deed and Assignment upon which the applicant bases the right-of-entry is found in Appendix I-5.

115. Status of Unsuitable Claims. The Horse Canyon Permit area is not within an area which has been designated as unsuitable for mining. There are public roads within 100 feet of the permit area.

116. through 150. Permit Terms, Insurance and Maps. The permit application is for a five-year permit term. The Certificate of Liability Insurance is carried by Associated Electric & Gas Insurance Services Limited (Appendix I-3).

The Permit Application Package (PAP) is clear, concise and filed in a format which is acceptable to the Division. A notarized signature by the coal supply managers stating that all information in the permit is true and correct is found on the first page of the permit application.

All maps and plans are of an appropriate scale, and all applicable maps and plans distinguish between operations which occurred prior to August 3, 1977.

COMPLIANCE

The applicant is in compliance with all sections of R614-301-100.

R614-301-200 SOILS (HS)

210. Introduction. The applicant has proposed the reclamation of approximately 53 acres, during the mining phase of operations (pages VIII-17 through VIII-36). An additional 12.61 acres of disturbance will be reclaimed at a later date, during the reclamation phase of operations (page VIII-36). The Lila Canyon portals (0.8 acres of disturbance) will not be reclaimed, however, the portals have been sealed and mine equipment has been removed from the area (page II-14). All surface disturbance occurred prior to PL 95-87 (i.e., pre-law) (page II-4). Therefore, topsoil was not salvaged prior to surface disturbance and the applicant has proposed the use of substitutes topsoil material for reclamation (page II-16). The borrow area disturbance will be approximately 10 acres during the mining (8 acres) and reclamation phases (1.6 acres) (page VII-18). A complete discussion of the borrow area topsoil material proposed as substitute topsoil may be located in Section 7.4.2. A small topsoil stock pile (30 cubic yds) located adjacent to the Road Junction Refuse Pile, will be used to cover portions of the refuse pile (VIII-18).

220. Environmental Description. The soils of the Horse Canyon Mine permit area are highly variable. Therefore, the forthcoming discussion will be limited to the soils in the vicinity of the disturbance and the soils of the proposed borrow area.

The soils of the Horse Canyon Mine are primarily colluvium, alluvium, and glacial outwash derived primarily from sandstone and shale. The soils tend to be coarse-loamy to loamy mixed (calcareous) mesic throughout the profile.

An aridic to ustic moisture regime with a mesic temperature regime prevails.

Average annual precipitation is between 8-14 inches with the mean annual soil temperature higher than 7°C, but lower than 10°C. The topography of the area is gently sloping to steep, ranging from 1 to 50 percent slope. The aspect ranges from north to south. The soil capability classification ranges from III to VIII-S non-irrigated.

Under native vegetation erosion hazards associated with these soils are moderate to high. The erosion hazard for disturbed soils is high to sevier. These soils are generally well drained and range in texture from fine sandy loam to very bouldery loam. The pH of the surface horizon ranges from neutral to highly alkaline (>9.0). The electrical conductivity is generally low (<4 mmhos/cm at 25°C). The depths of reported A horizon range from 4 to 8 inches.

The Horse Canyon Mine soil resource is surveyed at the Order II scale. Correlation of site map units with currently recognized soil series or map units are as follows: Gerst-Badland-Rubbleland Complex 15-50% slope; Glenberg fine sandy loam

1-3% slope; Strych very bouldery loam 15-45% slope; Strych very stony loam 5-15% slope. The soils in the vicinity of the disturbance are coarse-loamy to loamy, mixed (calcareous), mesic, shallow ustic torrifluvents to torriorthents. The soils within the proposed topsoil borrow area are loamy-skeletal, mixed (calcareous), mesic ustollic calciorthids. Soil profile depths generally range from 20 to greater than 60 inches.

The major limiting factors for the soils in the vicinity of the disturbance is low organic matter content and the high percentage of rock fragments. Thus the available water capacity is low and the erosion hazard is high.

The major limiting factor for the soils within the proposed topsoil borrow area are high pH, high alkalinity (calcic horizon) and suspect high sodium absorption ratio. Hence, the soils are low in nutrient availability and have poor physical conditions which deter water movement and root penetration.

221. Prime Farmland Investigation. An investigation was conducted to determine if prime farmland exists within the permit area. Francis T. Holt, State Soil Conservationist (1983) for the U.S. Soil Conservation Service, determined that the soils within the permit area do not meet the requirements for prime farmland (Appendix VII-6).

230. Operations Plan. The disturbance associated with the Horse Canyon Mine occurred pre-law. Therefore, topsoil was not salvaged from the disturbed area. The applicant has proposed utilizing substitute topsoil as a plant growth medium for final reclamation. Substitute topsoil material will be derived from a borrow area south of the Road Junction Refuse Pile. The dimensions of the borrow area are depicted on DWGS No. II-3G and III-1G. Approximately 88,000 cubic yds of topsoil will be required during the mining phase of operations (page II-17). Approximately 52,000 cubic yds of topsoil will be required during the reclamation phase of operations (page VIII-18). Topsoil from the borrow area will be removed from the eastern side of the pit during the mining phase and be contoured to act as its own sedimentation pond (page II-18). Topsoil will be excavated by front-end loaders, trucks, scrapers and dozers (page VI-18). Small tree branches and shrubby vegetation will be removed as part of the soil removal process (page VII-19). Large stones and boulders will be selectively removed and placed in the excavated borrow area to provide small mammal habitat or used as fill material in highwalls. During excavation of the borrow area soils, an experienced soil technician will periodically sample soil material as they are exposed (page VII-19). This procedure will identify and separate the highly alkaline (pH greater than 9.0 SI) calcic horizon (refer to section R614-301-233) from the suitable soil material above and below the calcic horizons. Heavy machinery operators will then be instructed to separate the calcic horizon. The soil material within the calcic horizon will be placed at the bottom of the reclaimed soil profile, in direct contact with the

regraded spoils/refuse. The soil material below the calcic horizon (lithic-paralithic contact) will then be redistributed and finally the topsoil material above the calcic horizon will be redistributed as a top dressing (i.e., topsoil). Material will be tested on sight for the following constituents: pH and electrical conductivity. The Division guidelines for Management of Topsoil and Overburden, Table 2 will be utilized as the basis for topsoil suitability (pages VII-19, 19A & 19B). The sideslopes of the borrow pit will not exceed 3 horizontal: 1 vertical (page VIII-18). Sufficient quantities of topsoil will be left in the bottom of the borrow area and will be permanently reclaimed according to the procedures discussed in Section 7.5 and 8.4.2.

233. Topsoil Substitutes and Supplements. Borrow area soil map unit descriptions and soil pedon descriptions are located in Appendices VII-1 and VII-2 respectively. Borrow area design dimensions and soils map may be located on DWGS II-3G, III-1G and Plate VII-1A respectively. Physiochemical data of the disturbed landfill, coal refuse and borrow area soils are located in Appendices VII-4 and VII-7.

The proposed design and location of the topsoil borrow area has been revised as of April 29, 1991. On this date, Henry Straw (Kaiser Engineers) met with Division staff to discuss laboratory results and borrow area locations. In this meeting, Division staff expressed concern as to the continued erroneous sodium absorption ration (SAR) results and the high pH readings. Division staff ascertain that the SAR's were based on total calcium, magnesium, and sodium instead of water soluble concentrations. Additionally, the new borrow area configuration includes areas which have not been fully characterized.

A calcic soil horizon exists within the borrow area profile. A calcic horizon is a horizon of accumulation of calcium carbonate or of calcium and magnesium carbonate (U.S.D.A Agriculture Handbook No. 436). The horizon is located at depths between approximately 14 to 60 inches. The horizon tends to be light yellowish brown in color and cobbly sandy loam in texture. The soil within this horizon is highly alkaline and, therefore, a poor quality plant growth medium. Additionally, there may be elevated exchangeable sodium levels within the calcic horizon which may further diminish the quality of this horizon.

The applicant will be in compliance with this section when the following stipulation is adequately addressed.

Stipulation R614-301-233. (HS) (1) Within 30 days of permit approval, the applicant must depict the new dimensions of the borrow area to include sample site locations #7, #8, and #15. Sample sites must be fully characterized down to the planned excavation depth including the soil material which will remain and act as the plant growth medium for reclamation of the borrow area. Laboratory analysis must

follow the suggested methodologies outlined in the Divisions Guidelines for Management of Topsoil and Overburden (Table 1).

Additionally, the applicant must include a specific description of the soil handling plan for the excavation of the borrow area soil and its redistribution upon the regraded disturbed area.

240. Reclamation Plan. Coal refuse material (see R614-301-731.300 Acid- and Toxic-Forming Material) concrete rubble, pavement, and shale will be covered with four feet of uncontaminated substitute topsoil or removed and placed adjacent to highwall material (pages VII-21, VII-23, II-17, VIII-17 through VIII-36). The Hillside Refuse Pile and the outer slopes of the Road Junction Refuse Pile (Plates VII-4A & B) are pre-law and hence will not be reclaimed (page II-15). Coal refuse material, in the past, was utilized as pad base and fill for the main facilities area. Approximately 75 feet of the Horse Canyon Creek stream channel is comprised of coal refuse and will be pulled back and compacted against an adjacent highwall (page IV-8). This material will be covered as described above.

Some disturbed areas will not receive topsoil (page VII-23). The clean soil surface will be tested for parameters listed in Section 7.2.3, ripped, mulched, fertilized and seeded according to the procedures outlined in Section 8.5.

All regraded areas will be scarified to a depth of 18" prior to redistribution of topsoil or seedbed preparation. All roadbeds and certain highly compacted areas will be scarified twice. If soils become compacted during redistribution, then the soil surface will also be scarified (pages II-19 & VIII-12). Topsoil (see R614-301-230) will then be redistributed upon the regraded spoil/refuse. Topsoil will be unevenly end-dumped on the regraded spoils (pages II-19 & VII-22). This will provide a roughened soil surface and provide variability in the microclimate which will promote a diverse vegetative community.

Fertilizer will be applied in the fall and spring in accordance with laboratory results and procedures outlined in Section 7.6.

In all areas receiving topsoil, three tons/acre of alfalfa or grass hay will be incorporated into the top 4 to 6 inches by the action of the drill seeder. In areas that are too steep for machinery operations seed will be hand broadcast and mulch will be incorporated by raking or backdragging chains (pages II-25, VIII-13, VIII-15, VII-22). On steep slopes (greater than 2.5h:1v), erosion control matting will be installed. These slopes will also be gouged from 6 to 12 inches deep on 20-30% of the slope surface (pages VII-22 & VIII-15).

Specific areas will receive various combinations of the reclamations procedures described above. Details for each reclaim area may be located on pages VIII-17 through VIII-36.

COMPLIANCE

The applicant is in compliance with all sections of R614-301-200, except for the stipulation in section R614-301-233.

R614-301-300 BIOLOGY (SW)

320. Environmental Description. The only major vegetation type identified within the Horse Canyon permit area is the Pinyon-Juniper Woodland. The Soil Conservation Service has determined the area to be capable of producing approximately 750 lbs/Acre air-dry forage per year. The permit area is rated as high priority deer winter range (page IX-5). Wildlife use is restricted in the area due to lack of water. A raptor survey was conducted on June 25, 1990. Nests were found in the permit area, however, none within the Division of Wildlife Resources (DWR) half mile radius disturbance buffer zone (Appendix IX-5). The permit area is within the range of the black-footed ferret, the bald eagle and peregrine falcon, however, no sitings have occurred (page IX-7). Two plant species which are currently Category 2 candidates for listing are potentially within the permit area, however, no observations have been made (page VIII-6).

The reference area is designated on the vegetation map (Plate VIII-1A and 1B). Raptor nest locations are shown on a map in Appendix IX-4.

330. Operation Plan. The applicant has committed to interim revegetation during the mining phase (pages VIII-9 & 10). These areas are expected to be small since a large portion of the disturbed area is being reclaimed. Potential impacts to wildlife during operation are road kills, poaching and some habitat destruction for small mammal or reptiles (page IX-8). Impacts will be minimized by informing workers as to the wildlife in the area (page IX-9). The sediment ponds on the disturbed area may provide additional water for wildlife.

Potential impacts of subsidence are listed on page V-11. The greatest potential impact of subsidence to vegetation or wildlife would be disruption of the hydrologic resources. Subsidence studies at the Horse Canyon Mine have shown that subsidence is probably completed within 2 years of mining (page V-14). The mine has not been in operation since 1982, therefore, no subsidence is expected.

340. Reclamation Plan. A detailed schedule for revegetation is given on page VIII-31. The schedule plans for 250 days from permit approval to completion of all activities including fencing. The seed mixture for permanent revegetation (page VIII-38) contains species adapted to the site and known to be palatable to most wildlife species. Procedures for seeding is to rip, topsoil, mulch and fertilize, and then drill seed. Alfalfa hay will be applied at three tons per acre. The hay will be incorporated into the soil by the action of the seed drill. Steeper slopes will be hand broadcast, mulched and then covered with erosion control netting. Some areas which will not be regraded have existing vegetation dominated primary by Rabbitbrush. On these sites, the seed will be broadcast and a tracked vehicle will run over the site in two directions to reduce the Rabbitbrush crown (Chapter VIII).

All areas will be fenced to exclude livestock grazing. Wildlife enhancement measures are a part of the reclamation plan. Some sites will be planted with #1 size shrub stock to augment the existing community. Also, any small pinyon pine and juniper trees removed from the topsoil borrow area will be replanted in the disturbed area to provide wildlife cover (page VIII-16). Rock piles will also be placed on the regraded areas to provide cover and shelter for small mammals.

350. Performance Standards. The vegetative cover produced from the revegetation is designed to meet the performance standards for success. All seed species except two legumes are native to the area. The two legumes are included for nitrogen fixing capabilities and are not aggressive invading species (page VIII-39). All seed will be tested by a certified seed analyst. The seed will not contain any noxious weed seed. Seeding will be done after October 1st and prior to December 1st. This is the regionally accepted seeding window.

The postmining land use is for wildlife habitat. Therefore, the applicant's vegetative success standard is to meet cover and shrub density requirements. The cover requirements will be at least 90% of the reference area vegetative cover (page VIII-42). The shrub density will meet the goal of 3000 stems/acre (page VIII-45). Statistically valid sampling techniques for measuring success as outlined by the Division will be used to determine revegetation success. Horse Canyon receives less than 26 inches annual precipitation, therefore, the period of extended responsibility will be not less than 10 full years. Quantitative monitoring of the reclaimed site will occur in years 2, 3, 5, 9, and 10 (page VIII-45). Qualitative sampling will occur annually. Quantitative sampling will be partitioned into reclamation treatment areas (VIII-2A through VIII-3G). This partitioning will reduce sample numbers and assure that all areas meet the performance standards. Diversity standard will compare with the reference area. The revegetated community will have at least 5 shrub species of which none will comprise more than 50% of the total number of shrub plants.

Shrub diversity may be the most difficult performance standard to meet. Observations from onsite and surrounding disturbances show that Rabbitbrush invades the areas in high numbers. Mechanical treatment may be needed in subsequent years to encourage shrub diversity.

The U.S. Fish and Wildlife Service has determined that the powerlines to the mine are not a hazard to raptors (Appendix IX-3). The fence design for excluding livestock has a smooth top wire as directed by DWR. All hazardous and toxic-forming materials have been removed from site.

COMPLIANCE

The applicant is in compliance with all sections of R614-301-300.

R614-301-400 LAND USE AND AIR QUALITY (SW)

411. Environmental Description. The current locally designated land use for the area is industrial/commercial. Mining has occurred in Horse Canyon since the early 1900's, therefore, premining land capability is not available. However, vegetative studies from similar areas adjacent to the canyon suggest that the land is capable of producing 750 pounds/acre forage a year. Premining land use was probably wildlife forage and big game winter range (page X-14). Cattle grazing only occurred while trailing the animals to and from summer range.

There are no known cemeteries, burial grounds, or other cultural resources listed in the National Register of Historic Places. The tree with the inscription "1878 Sam Gilson By God" is posted by the Utah Historical Society. While this site is not on the National Register, it does have future potential listing significance. Reclamation activities should have no effect on this site. The applicant stresses avoidance as a protective measure. Surveys for cultural resources have been conducted by BLM and a consultant (Appendix X-1 and X-2). The State Historic Preservation Officer concurs with the consultants findings of no eligible sites (June 20, 1990, Appendix X-3). The Horse Canyon mine was mined from the early 1900's until 1982. Room and pillar mining followed by extensive retreat mining was employed. Underground workings are shown on Plate II-2.

413. Performance Standards. The surface owner is the applicant and states that the planned postmining land use will be for wildlife habitat (page X-15). Land use for more intensive purposes are not justified. Water seems to be the limiting factor in more intensive land use. Wildlife habitat will be restored by returning the area to

approximate original contour, planting species which are palatable to wildlife, providing cover, and sediment pond depression will provide some extended water.

COMPLIANCE

The applicant is in compliance with all sections of R614-301-400.

R614-301-500 ENGINEERING (JK)

512. Certifications. All maps, plans, and engineering designs which require certification have been certified by a qualified, registered, professional engineer.

513. Compliance with MSHA Regulations and MSHA Approvals. There are no impoundments or sedimentation ponds at this site which meet the size or capacity criteria of MSHA, 30 CFR 77.216(a).

The only refuse pile on the property is the Road Junction Refuse Pile. Outcrops of this refuse pile are outside the area of postlaw disturbance and only the top of the pile will be reclaimed (see page IV-4). The pile has been demonstrated to have a static safety factor of more than 1.5 (see Appendix IV-1). If additional material is added to the pile, it will be compacted in 24-inch lifts and covered with at least four feet of substitute soil material. The refuse pile will be inspected quarterly by a qualified person for stability, seepage, or other problems which might degrade its integrity (see pages IV-4 to IV-9).

There are 12 underground openings and two drill holes, the locations of which are shown on Plates II-1A and II-1B, "Facilities Map." All underground openings were sealed during the third quarter of 1986 with solid block walls. All openings except the main portal (south) and the manway portal will be backfilled during the mining plan period with no less than 25 feet of inert, non-combustible fill material, in accordance with MSHA, 30 CFR 75.1711, and as shown in Figure 4.6.2-1 (see page IV-17). The main portal (south) and the manway portal will be backfilled in the same manner during the reclamation plan period (see pages IV-15 to IV-17).

Both drill holes have been temporarily plugged. They will be maintained in this temporarily plugged condition through the mining plan period. During the reclamation plan period, they will be filled with concrete from bottom to collar (see pages IV-15 and Appendix IV-3). This plan for permanently plugging the drill holes is sound engineering practice and is in accordance with United States Geological Survey (USGS) stipulations for surface drilling programs.

514. Inspections. The Road Junction Refuse Pile will be inspected quarterly by a qualified person for stability, seepage, or other problems which might degrade its integrity. The results of these inspections will be recorded by the Applicant. If problems are found, they will be reported to the Division (see page IV-5).

515. Reporting and Emergency Procedures. The Applicant will report any slide or impoundment hazard to the Division and comply with any remedial measures which the Division may require (see page II-35).

521.100 Operation Plan. Cross Sections and Maps.

521.110 Previously Mined Areas. Plate, II-2, "Underground Development Map," shows the location and extent of known workings of active, inactive, and abandoned underground mines within the permit and adjacent areas.

521.120 Existing Surface and Subsurface Facilities and Features. Plates II-1A and II-1B, "Facilities Map," show all buildings, manmade features, roads, refuse areas, impoundments, embankments, etc. within and adjacent to the permit area.

521.130 Landowners and Right of Entry and Public Interest Maps. Plates I-1, "Surface Ownership," and I-2, "Coal Ownership," show the boundaries of all lands and present owners of those lands, both surface and subsurface, included in or contiguous to the permit area.

521.140 Mine Maps and Permit Area Maps. Plates II-1A and II-1B, "Facilities Map," and II-2, "Underground Development Map," show the boundaries of all areas proposed to be affected over the total life of the coal mining and reclamation operations. The disturbed area boundaries are shown correctly and are those that were set jointly by the Division and the Applicant during a March 6, 1991 onsite consultation. A planimeter check of the total disturbed area, as shown on these maps, verifies it to be approximately 63.6 acres as the Applicant maintains.

521.150 Land Surface Configuration Maps. Plates II-3A through II-3G, "Mining Plan-Grading and Drainage," and III-1A through III-1G, "Reclamation Plan-Grading and Drainage," adequately represent the present and anticipated future land surface configuration.

521.160 Maps and Cross Sections of the Proposed Features for the Proposed Permit Area. Plates II-1A and II-1B, "Facilities Map," IV-1A through IV-1K, "Cross Sections-Mining Plan," and IV-1L through IV-1P, "Cross Sections-Reclamation Plan," show facilities, land areas, storage areas, and all other features required to be shown in this part. A planimeter check and topographic map comparison of all cross sections shows that they are consistent with the mining plan and reclamation plan

maps (Plates II-3A through II-3G and III-1A through III-1G, respectively) and with the Reclamation Cost Estimate (Appendix IV-4), which is based upon them.

521.170 Transportation Facilities Maps. All maps show the roads within and adjacent to the permit area, roads being the only remaining transportation facility.

521.200 Signs and Markers Specifications. Mine and permit identification signs, perimeter markers, and buffer zone markers will be made of rigid material and will be maintained throughout the life of the permit (see page II-5). Mine identification signs will show the main name, the Applicant's name, the Applicant's address and telephone number, and the mine permit number. Identification signs will be placed at six points of access to the property (see Appendix II-2).

522. Coal Recovery. This section is not applicable because the mine is inactive.

523. Mining Method(s). This section is not applicable because the mine is inactive.

524. Blasting and Explosives. This section is not applicable as explosives will not be used during the mining plan or reclamation plan periods (see page IV-3).

525. Subsidence. The Applicant will not maintain any subsidence monitoring program during either the mining plan period or the reclamation plan period. Since mining ceased in October of 1982, all subsidence, under the conditions which prevail at this mine, can be expected to have occurred by 1986, if not sooner [see Subsidence Engineers' Handbook, Second (revised) Edition, National Coal Board, London, 1975, Subsidence-Time Estimation Nomogram, page 43]. For this reason, subsidence monitoring would serve no useful purpose.

Instead of subsidence monitoring, the Applicant will perform a one-time walking reconnaissance of the surface above the mined out area. This reconnaissance will serve to locate and qualitatively describe any surface subsidence effects such as fissures, slope instability, surface and/or groundwater disruption, and vegetation damage. The reconnaissance will be performed during the first field season of the reclamation plan period (see page V-15).

526. Mine Facilities. Appendix II-1 contains a full description of all mine facilities. The locations of all mine facilities are also shown on Plates II-1A and II-1B, "Facilities Map." Most surface facilities have been demolished and removed. The following facilities remain and will remain throughout the mining plan period. Each facility is listed with the number which identifies it on the map:

- (i) Mine Office - #23
- (ii) Warehouse - #25
- (iii) Bath House - #21
- (iv) Machine Shop - #27
- (v) Powder and Cap Magazines - #32
- (vi) Main Intake Portal (South) - #54
- (vii) Manway Portal - #55
- (viii) Metal Water Storage Tank - #28
- (ix) Plant Well Pump House - #43

527. Transportation Facilities. Only one primary road, the main road, will remain open to traffic during the mining plan period. The access roads north of Horse Canyon Creek will be eliminated completely during recontouring. The access roads south of Horse Canyon Creek will be closed to traffic and used as runoff diversions (see pages II-11 to II-12, II-15, and IV-10 to IV-12).

The main road is owned and maintained by the Applicant. It provides access to the Book Cliffs/Range Creek area for local, state and federal government personnel, ranchers, and recreationists. It will follow its present route except where it now crosses the main surface facilities pad, where it will be relocated approximately 100 feet to the south to allow for recontouring of the pad away from Horse Canyon Creek (see pages IV-10 to IV-12 and Plates II-3B through II-3F, "Mining Plan-Grading and Drainage").

The bridge over which the main road crosses Horse Canyon Creek will be left in place with some modifications. On the upstream side, the metal supports will be cut back level with the ground surface. On the downstream side, the metal supports will be cut back level with the top of the concrete abutment (see page IV-11A). These modifications will improve the stability of the soil and the filtration structure which will be installed during the mining plan period.

528. Handling and Disposal of Coal, Overburden, Excess Spoil, and Coal Mine Waste. When the mine started in the 1940s, there was no attempt to save topsoil or to segregate spoil, coal mine waste, and development waste. These materials were all intermixed and used in the present facility pads.

A small portion of the main road will be regraded where the road will be relocated. This will be in the area of the main building pad, as shown on Plates II-3D and II-3E, "Mining Plan-Grading and Drainage." The top of the landfill will also be regraded in order to cover debris which now protrudes from its surface. Material from the borrow area will be used for this purpose (see page IV-8).

Refuse material in fills facing Horse Canyon Creek will be pulled back 75 feet from the channel and the new slope will be brought to 2h:1v. The material removed from the edges of pads and fills will be compacted against the base of an adjacent highwall. Clean fill from recontouring and from the borrow area will be used to cover any exposed refuse material to a depth of at least four feet. Plates II-3A through II-3F, "Mining Plan-Grading and Drainage," show the postmining topography and the areas which will be covered with substitute soil material. Cross sections of the existing and final configurations are shown on Plates IV-1A through IV-1K, "Cross Sections-Mining Plan" (see pages IV-8 to IV-9).

529. Management of Mine Openings. There are 12 underground openings and two drill holes, the locations of which are shown on Plates II-1A and II-1B, "Facilities Map." All underground openings were sealed during the third quarter of 1986 with solid block walls. All openings except the main portal (south) and the manway portal will be backfilled during the mining plan period with no less than 25 feet of inert, non-combustible fill material, in accordance with MSHA, 30 CFR 75.1711, and as shown in Figure 4.6.2-1 (see page IV-17). The main portal (south) and the manway portal will be backfilled in the same manner during the reclamation plan period (see pages IV-15 to IV-17).

Both drill holes have been temporarily plugged. They will be maintained in this temporarily plugged condition through the mining plan period. During the reclamation plan period, they will be filled with concrete from bottom to collar (see pages IV-15 and Appendix IV-3). This plan for permanently plugging the drill holes is sound engineering practice and is in accordance with United States Geological Survey (USGS) stipulations for surface drilling programs.

530. Operational Design Criteria and Plans.

532. Sediment Control. For both the disturbed area and for those undisturbed areas which cannot be made to bypass the disturbed area, silt fences and sediment ponds will be used for sediment control during the mining plan period. Silt fences will be used to control sedimentation from topographically isolated areas and from temporarily or permanently reclaimed areas. These silt fences, combined with berms, will insure that drainage from such areas is treated.

Two sediment ponds will be used to treat runoff from most of the disturbed areas. Each has been designed to completely contain a 10-year, 24-hour storm as well as three years of sediment accumulation. The spillway structure of each pond is also designed to safely pass the peak flow of a 25-year, 6-hour storm (see pages II-29 to II-30 and VI-22 through VI-26).

533. Impoundments. Pond designs have been analyzed for stability using a standard rotational failure model. Sedimentation Pond #1 has a static safety factor of 5.8 and a seismic safety factor of 4.2 while Pond #2 has a static safety factor of 5.7 and a seismic safety factor of 4.2. These values are more than triple the respective required values of 1.5 and 1.2 (see Appendix IV-2).

The sedimentation ponds have been designed to completely contain a 10-year, 24-hour storm as well as three years of sediment accumulation. The spillway structure of each pond is designed to safely pass the peak flow of a 25-year, 6-hour storm.

Construction of the ponds will be done under the supervision of a professional engineer. During the mining plan period, both ponds will be inspected monthly by a qualified person designated by the Applicant (see pages II-31 and IV-25).

534. Roads. Only the main road will remain open to traffic during the Mining Plan period. The access roads north of Horse Canyon Creek will be eliminated completely during recontouring. The access roads south of Horse Canyon Creek will be closed to traffic and used as runoff diversions (see pages II-11 to II-12, II-15, and IV-10 to IV-12).

The main road will remain a primary road. It will be approximately 20 feet wide and will slope away from both sides of the crest at a 2% slope. Its surface will consist of 10 inches of aggregate above a compacted subgrade (see pages IV-10 through IV-13 and Figure IV-2). These design parameters constitute good standard engineering design practice. An analysis of this design using a standard rotational failure model shows that the road outslopes will achieve a static safety factor of at least the required 1.3 (see Appendix IV-2).

The main road is owned and maintained by the Applicant. It provides access to the Book Cliffs/Range Creek area for local state and federal government personnel, ranchers, and recreationists. It will follow its present route except where it now crosses the main surface facilities pad, where it will be relocated approximately 100 feet to the south to allow for recontouring of the pad away from Horse Canyon Creek (see pages IV-10 to IV-12 and Plates II-3B through II-3F, "Mining Plan-Grading and Drainage").

535. Spoil. See section 528, Handling and Disposal of Coal, Overburden, Excess Spoil, and Coal Mine Waste, above.

536. Coal Mine Waste. See section 528, Handling and Disposal of Coal, Overburden, Excess Spoil, and Coal Mine Waste, above.

537. Regraded Slopes. A small portion of the main road will be regraded where the road will be relocated. This will be in the area of the main building pad, as shown on Plates II-3D and II-3E, "Mining Plan-Grading and Drainage." The top of the landfill will also be regraded in order to cover debris which now protrudes from its surface. Material from the borrow area will be used for this purpose (see page IV-8).

Refuse material in fills facing Horse Canyon Creek will be pulled back 75 feet from the channel and the new slope will be brought to 2h:1v. The material thus removed from the edges of pads and fills will be compacted against the base of an adjacent highwall. Clean fill from recontouring and from the borrow area will be used to cover any exposed refuse material to a depth of at least four feet. Plates II-3A through II-3F, "Mining Plan-Grading and Drainage," show the postmining topography and the areas which will be covered with substitute soil material. Cross sections of the existing and final configurations are shown on Plates IV-1A through IV-1K, "Cross Sections-Mining Plan" (see pages IV-8 to IV-9). A stability analysis of the steepest regraded slopes, using a standard rotational failure model, shows the safety factor to be at least 1.3 at the fill surface, with the safety factor increasing with depth (see Appendix IV-2).

542. Reclamation Plan. Narratives, Maps and Plans.

542.100 Reclamation Timetable. The Applicant has included a reclamation schedule in the plan. It includes seven categories of reclamation activities: Bid Preparation, Demolition Bidding, Contract Awarding, Demolition, Reclamation Bidding, Contract Awarding, and Reclamation (see page II-36). The Applicant has included a plan for backfilling and grading. It includes final removal of structures, regrading, and covering of coal mine waste material and acid- and toxic-forming material with at least four feet of clean, inert substitute soil material (see pages II-36, III-4, III-6, Plates III-1A through III-1G, "Reclamation Plan-Grading and Drainage," and Plates IV-1A through IV-1K, "Cross Sections").

542.300 Surface Configuration Maps. The Applicant has included a complete and detailed set of maps and cross sections which depict the final surface configuration (see Plates III-1A through III-1G, "Reclamation Plan-Grading and Drainage," and Plates IV-1A through IV-1K, "Cross Section").

542.400 Removal of Temporary Structures. All sedimentation ponds will be regraded or breached when vegetation and water quality standards are met for the reclaimed areas. Runoff that was treated by ponds will then be directed to silt fences (see pages VI-26 to VI-27).

542.600 Roads. The main road which crosses the surface facilities area and the road bridge across Horse Canyon Creek will be removed during the reclamation

plan period unless title is transferred to a public entity (see page II-15). If the road is retained as a permanent feature, it will follow its present route, except in the area of the main facilities pad, where it will be rerouted through the area now occupied by the warehouse and machine shop (see Plate III-1D, "Reclamation Plan-Grading and Drainage").

542.700 Final Abandonment of Mine Openings and Disposal Areas. There are 12 underground openings and two drill holes, the locations of which are shown on Plates II-1A and II-1B, "Facilities Map." All underground openings were sealed during the third quarter of 1986 with solid block walls. All openings except the main portal (south) and the manway portal will be backfilled during the mining plan period with no less than 25 feet of inert, non-combustible fill material, in accordance with MSHA, 30 CFR 75.1711, and as shown in Figure 4.6.2-1 (see page IV-17). The main portal (south) and the manway portal will be backfilled in the same manner during the reclamation plan period (see pages IV-15 to IV-17).

Both drill holes have been temporarily plugged. They will be maintained in this temporarily plugged condition through the mining plan period. During the reclamation plan period, they will be filled with concrete from bottom to collar (see pages IV-15 and Appendix IV-3). This plan for permanently plugging the drill holes is sound engineering practice and is in accordance with United States Geological Survey (USGS) stipulations for surface drilling programs.

Excess spoil and coal mine waste will be disposed of as described in 528, Handling and disposal of Coal, Overburden, Excess Spoil, and Coal Mine Waste, above.

542.800 Reclamation Cost Estimate is \$1,950,002 in 1991 dollars (see page IV-18 and Appendix IV-4).

550. Reclamation Design Criteria and Plans.

551. Casing and Sealing of Underground Openings. There are 12 underground openings and two drill holes, the locations of which are shown on Plates II-1A and II-1B, "Facilities Map." All underground openings were sealed during the third quarter of 1986 with solid block walls. All openings except the main portal (south) and the manway portal will be backfilled during the mining plan period with no less than 25 feet of inert, non-combustible fill material, in accordance with MSHA, 30 CFR 75.1711, and as shown in Figure 4.6.2-1 (see page IV-17). The main portal (south) and the manway portal will be backfilled in the same manner during the reclamation plan period (see pages IV-15 to IV-17).

Both drill holes have been temporarily plugged. They will be maintained in this temporarily plugged condition through the mining plan period. During the reclamation plan period, they will be filled with concrete from bottom to collar (see pages IV-15 and Appendix IV-3). This plan for permanently plugging the drill holes is sound engineering practice and is in accordance with United States Geological Survey (USGS) stipulations for surface drilling programs.

552. Permanent Features. All impoundments will be removed and filled. The borrow area will be contoured during topsoil removal and revegetated and will be left as a small depression (see page III-6).

553. Backfilling and Grading. Most backfilling and grading will be accomplished during the mining plan period. Consequently, the final surface configuration will be almost identical to the surface configuration achieved during the mining plan period. All disturbed areas will be backfilled and graded to achieve approximate original contour and all highwalls will be eliminated. Hence, no variances from the approximate original contour restoration requirements set forth in R614-302-270, as cited in R614-305-553.600, will be or need be approved by the Division.

During the reclamation plan period, then, the following will be accomplished to bring the site to its permanent configuration (see page III-6):

- 1) The remaining structures will be demolished and removed. Their foundations will be broken up and the debris placed at the base of the highwall backfill (see page III-5).
- 2) The area previously occupied by the large metal water tank will be recontoured and the runoff controlled by a berm and silt fence (see Plate III-1F, "Reclamation Plan-Grading and Drainage").
- 3) The area around the powder and cap magazines will be recontoured and the runoff controlled by a berm and silt fence (see Plates III-1E and III-1F, "Reclamation Plan-Grading and Drainage").
- 4) The area around the main portal (south) and the manway portal will be backfilled, recontoured, and revegetated. Runoff from this area will be directed, by ditch, to sedimentation pond #2 (see Plate III-1E, "Reclamation Plan-Grading and Drainage").
- 5) The bench area remaining after the main buildings have been removed will be backfilled with four feet of uncontaminated material (including at

least 1 foot of topsoil from the borrow area), recontoured, the main road relocated (if title is transferred to public entity), and the area revegetated. Runoff from the area will be controlled by a berm and directed, by ditch, to sedimentation pond #2 (see Plate III-1D, "Reclamation Plan-Grading and Drainage").

- 6) The borrow area used during the Reclamation plan period will be contoured during soil and subsoil removal, left as a small depression, and revegetated when the required material has been removed. A berm will direct undisturbed runoff around and away from the disturbed area (see Plate III-1G, "Reclamation Plan-Borrow Area").

The steepest postmining slope, as a worst case, was analyzed for stability using a standard rotational failure model. It was found to have a static safety factor of at least the required 1.3. Thus, the planned postmining surface configuration meets the stability requirement of R614-301-553.130.

COMPLIANCE

The Applicant is in compliance with all sections of R614-301-500.

R614-301-700 HYDROLOGY (TM)

710. Introduction. Description of the existing hydrologic resources are found in Sections 6.2 and 6.3 of the PAP. The Probable Hydrologic Consequences are stated in Section 6.7. Diversion designs for the site are included in Section 6.5 of the PAP. Section 6.6 illustrates adequate silt fence and sediment pond designs.

713. Inspection. Inspection of all sediment ponds will be conducted quarterly by a professional engineer (page VI-25) meeting the requirements of R614-301-514.300 - Impoundments.

720. Environmental Description. The results of the 1985 spring and seep survey conducted in the Horse Canyon Area is found on page VI-7. Groundwater encountered in the mine is described on page VI-9. The rate of inflow into the mine is unknown although approximately 2 CFS was discharged from the mine intermittently while the mine was operating.

724.100. Groundwater Information. Figure 6.2.2.1-1 is a graph of the flow of the four mine inflow monitoring points. No variations in flow can be attributed to seasonal influences. In 1986, Kaiser reentered the mine and found water in the area

of the rotary car dump at an elevation 5800 feet, assumed to be the potentiometric surface elevation in the rest of the mine (page VI-10).

Two wells are located within the alluvium of lower Horse Creek as shown on Plate VI-1.

Appendix VI-1 presents water quality data collected from springs sampled during the 1985 spring and seep survey. Renton Spring is sampled monthly for baseline parameters, but was only sampled for nine months in 1989. Data is submitted to the Division on a quarterly basis.

724.200. Surface Water Information. All surface water data is collected above the mine on the right or left forks of Horse Creek or below the mine on Horse Creek. U. S. Steel Water Quality Data spanning the years 1981 - 1983 is found in Appendix VI-1. U.S.G.S. Data summary for station 09314374 is found in Appendix VI-1 from August 1978 through September 1979. Data is currently collected monthly from Renton Spring, the only site with flow on any consistent basis.

724.300. Geologic Information. Regional groundwater resources are discussed on pages VI-4 through VI-9 of the PAP. The PAP discusses the stratigraphy and structure in Chapter V in a general nature. The last known data collected on groundwater levels within the mine was in 1986 when Kaiser Coal reentered the mine. At this time, water levels in the mine had changed little since operations ceased. All springs of known occurrences within or adjacent to disturbed areas are being sampled. The mine is sealed and as such, no additional sampling of groundwater levels or quality within the mine can occur. Springs outside the disturbed area or adjacent to it are not being sampled due to reclamation only status of the site.

There are no indications of any impacts to the quality and quantity of surface or ground water in the permit area or adjacent areas. All disturbed areas are treated with adequate sediment control measures and any additional disturbance to the permit area will involve reclamation only.

724.400. Climatological Information. The Division does not require a statement of climatological factors, although does suggest that the operator install a rain gauge to document precipitation data in the area during reclamation.

724.600. Survey of Renewable Resources Land. The applicant states on page VI-6A of the PAP that a visual inspection of the area showed no diminution of reasonably foreseeable use of aquifers. Since mining ceased in 1983, most

subsidence should have occurred and any subsidence impacts associated with mining would have most likely occurred within two years of the end of mining.

724.700. Alluvial Valley Floors. The operator provided sufficient data to demonstrate the absence of alluvial valley floors (page XI-3).

725. Baseline Cumulative Impact Area Information. The operator submitted the necessary hydrologic and geologic information to assess the probable cumulative hydrologic impacts.

727. Alternative Water Source Information. The Applicant lists all water rights within the area and states that any effects from subsidence has already occurred. Therefore, there is little potential for adverse effect to any water resources or water rights in the area (Page VI-14, PAP). The Division agrees with this statement due to the fact that reclamation will be the only impact during this permit term. The operator has submitted documentation of the 1.3 CFS of water rights currently in place, its source and availability in Appendix VI-6.

728. Probable Hydrologic Consequences (PHC) Determination. The Applicant provided documentation of previous water levels in the Columbia Mine, closed since 1960's, and compared those water levels with the mine water levels obtained in 1986. The water level has not changed since mining activities ceased. The Applicant provided adequate geologic and hydrologic information to support this conclusion.

In regards to reclamation and surface water impacts, the Applicant is providing sediment controls to control all runoff in a systematic and comprehensive plan using temporary and permanent controls. All controls are sized and designed as shown in Appendices VI-2 and VI-3 and Sections 6.5 and 6.6 of the PAP.

All springs and seeps have been surveyed and no documented diminution has occurred to quantity or quality to date.

The Probable Hydrologic Consequences statement states that the interruption, contamination, or diminution of any water resource would not likely occur within the permit area for the following reasons.

- 1) Surface water flows only a limited part of the year and will be protected by the use of extensive sediment control devices.
- 2) Springs are located upstream of the permit area or are in areas where subsidence resulting from post-1977 mining is not documented. No

known depletion of flow and quality of surveyed springs in the permit area exists.

- 3) Sediment control structures and erosion protection measures will upgrade during reclamation, a prime factor in maintaining the hydrologic balance within the mine permit area.

The Probable Hydrologic Consequences statement is found in Section 6.7.

730. Operation Plan. Diversion designs for the Horse Canyon Mine Site are discussed on pages VI-15 through VI-21 and the sediment control plan on pages VI-22 through VI-27.

The Applicant provided documentation regarding the location of silt fence installations and sediment ponds on Plates II-3 A-F and in Table 6.6.1-1.

All areas which do not drain to sediment ponds and are treated by silt fences or other alternative controls have the following information provided for each area:

- 1) Drainage area for each structure shaded or delineated.
- 2) Type of control and location of each control on a plate and in a table.
- 3) Volume of runoff for each treatment area using the 10 year - 24 hour storm event.
- 4) The total Best Technology Currently Available (BTCA) area versus total disturbed area.
- 5) A commitment to monitor drainage for state and federal limitations (if possible).

This information is assembled in a tabular form and presented in the PAP in Section 6.6.

731.210. Ground Water Monitoring. The only ground water station currently being monitored for the Horse Canyon Mine is Renton Spring. Baseline samples according to parameters listed in Division Guidelines, are being sampled on a monthly basis. This site is shown on Page VI-1, monitoring is included in Appendix VI-5.

731.220. Surface Water Monitoring. The Applicant's current sediment control plan includes two sediment ponds and as a result, the NPDES permit for the site was

revised and approved on April 4, 1991, General Permit No. UT6040000. Other sites monitored on Horse Creek are shown on Page VI-1.

A monitoring section discussing sampling site location, frequency sampled, and parameters sampled is included in Appendix VI-5.

731.300 Acid- and Toxic-Forming Materials (HS)

As indicated by the soils and coal refuse data in Appendix VII-7 and Appendix VII-4 and descriptions of the type of samples taken (coal and/or soil), it is reasonable to assume that the elevated hot water soluble selenium concentrations (>0.1 mg/kg Table 2, Division Guidelines for the Management of Topsoil and Overburden) are associated with coal and coal refuse at the Horse Canyon Mine. The applicant has committed to cover all coal refuse with four feet of uncontaminated substitute topsoil or remove coal refuse and placed it against an adjacent highwall (pages VII-21, VII-23, II-17, VII-17 through VIII-36).

731.400. Transfer of Wells. Two wells currently exist within the alluvium of lower Horse Canyon Creek. The location of these wells is shown on Page VI-1.

The Applicant discusses the intent for these wells and the fact they will be sealed during reclamation is found on pages VI-6 and VI-6A of the PAP. The wells must be sealed according to the criteria spelled out by the Division of Water Rights, State Engineer's Office.

731.600. Stream Buffer Zones. Due to the nature of the reclamation project and the impacts from past mining operations adjacent to Horse Creek, lands within 100 feet of Horse Creek will be disturbed, structures will be removed and areas reclaimed.

The operator is implementing the use of alternative sediment controls below any disturbance in Horse Creek, per recommendations made during a field visit by Division Hydrologist on 9/6/90 at the Horse Canyon site.

All permanent stream channel diversions have been designed according to the criteria required by R614-301-742.300.

Stream Buffer Zones will be marked according to the requirements specified in R614-301-521.260.

731.700. Cross Sections and Maps. All diversions and typical cross sections are presented on Plates II-3 A-F and V1-3.

All locations and elevations of each station to be used for water monitoring are shown on Plate VI-7.

All sediment ponds and silt fences are shown on Plates II-3A-F.

All plates required for this section are certified.

731.800. Water Rights and Replacement. All water rights within the immediate vicinity are listed on page VI-14. Intermountain Power Agency currently owns four water rights: 91-148, 91-149, 91-150 and 91-183. Documentation of these rights are found in Appendix VI-6.

742. Sediment Control Measures. All alternative sediment control devices are described on page VI-22 and Table 6.6 1-I. The controls will prevent additional contributions of sediment to Horse Creek and runoff outside the permit area, as well as minimize erosion and retain sediment within the disturbed area.

742.220. Sedimentation Ponds. The designs for all sediment ponds are contained in Appendix VI-4. Plate VI-4 shows the topography and cross sections of the redesigned sediment ponds. Table 6.6.1-3 presents the pond configuration and design details. Each pond will have the capacity to contain the 10-year, 24-hour runoff volume and three year accumulated sediment volume (page VI-24, PAP). All spillways are sized to adequately handle the 25-year, 6-hour storm event.

742.300. Diversions. All diversions are designed to pass the 10-year, 6-hour storm or greater and permanent diversions are designed using the 100-year, 6-hour storm peak flow. Channel depths were determined based upon the depth at the reach with the gentlest slope; velocities were determined based upon the reach with the steepest slope (page VI-15, PAP).

751. The operator has provided documentation of current NPDES permits for proposed ponds 1 and 2. The new UPDES permit No. is UT6040000.

755. Casing and Sealing of Wells. All wells, when properly identified regarding ownership, will be managed to comply with R614-301-748 and R614-301-765. Proper documentation of ownership and liability is discussed on pages VI-6 and VI-6A.

COMPLIANCE

The applicant is in compliance with all sections of R614-301-700.

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT
Intermountain Power Agency
Horse Canyon Mine
ACT/007/013

Carbon and Emery County, Utah
May 6, 1991

I. Introduction

The purpose of this report is to provide a Cumulative Hydrologic Impact Assessment (CHIA) for the Horse Canyon Mine located in Carbon and Emery County, Utah. The assessment encompasses the probable cumulative impacts of all anticipated reclamation activities in the general area on the hydrologic balance and whether the operations proposed under the application have been designed to prevent damage to the hydrologic balance outside the proposed mine plan area. This report complies with federal legislation passed under the Surface Mining Control and Reclamation Act (SMCRA) and subsequent Utah and Federal regulatory programs under R614-301-729 and 30 CFR 784.14(f), respectively.

Intermountain Power Agency's Horse Canyon Mine is located within the Book Cliffs Coal Field approximately 30 miles east of Price, Utah (Figure 1). The Book Cliffs form a rugged, southerly facing escarpment that delineates the Uinta Basin to the north from the San Rafael Swell to the south. Elevations along the Book Cliffs range from approximately 5,000 to 9,000 feet.

Outcropping rocks of the Book Cliffs range from Upper Cretaceous to Quaternary in age. The rock record reflects an overall regressive sequence from marine (Mancos Shale) through littoral and lagoonal (Blackhawk Formation) to fluvial (Castlegate Sandstone, Price River Formation and North Horn Formation) depositional environments. Oscillating depositional environments within the overall regressive trend are represented by members of the Blackhawk Formation and the Colton Formation. The major coal-bearing unit within the Book Cliffs Coal Field is the Blackhawk Formation.

Precipitation varies from 20 inches at the higher elevations to 5 inches at lower elevations. The Book Cliffs area may be classified as mid-latitude steppe to desert.

Vegetation varies from the saltbrush/grass community type at lower elevations to the Douglas fir/aspen community at higher elevations. Other vegetative communities include mountain brush, pinyon-juniper, pinyon-juniper/sagebrush and riparian. These communities are primarily used for wildlife habitat and livestock grazing.

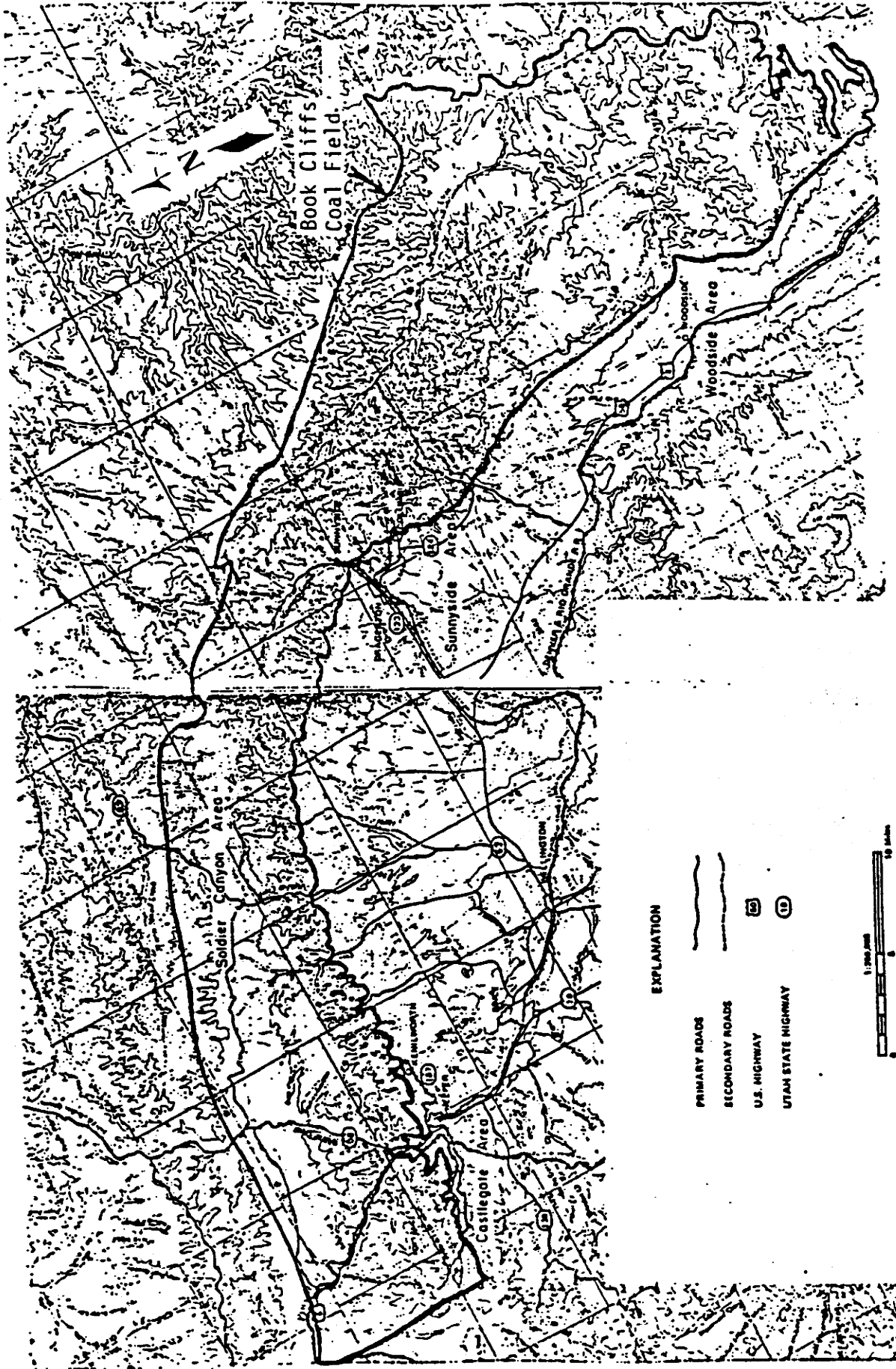


Figure 1. Book Cliffs Coal Field.

From: Doelling 1972.

Surface runoff from the Book Cliffs area flows into the Price River drainage basin of east-central Utah. The Price River originates near Scofield Reservoir and flows southeasterly into the Green River, north of the town of Green River, Utah. Water quality is good in the mountainous headwater tributaries, but deteriorates rapidly as flow traverses the Mancos Shale. The shale lithology typically has low permeability, is easily eroded and contains large quantities of soluble salts that are a major contributor to poor water quality. Depending upon the duration of contact, water quality degrades downstream to where total dissolved solids (TDS) levels of 3,000 milligrams per liter (mg/l) are not uncommon. The predominant ion leached from the Mancos Shale is sulfate (SO_4) with values over 1,000 mg/l common in the lower reaches of the Price River.

II. Cumulative Impact Area (CIA)

Figure 2 delineates the CIA for the Horse Canyon Mine. The CIA is defined by surface drainages and the groundwater basin which mimics surface topography. The CIA includes the drainage basin of the north and south fork Horse Canyon, Lila Canyon and the lower south fork Horse Canyon. The western boundary is designated by $110^\circ 22'$ longitude and the eastern boundary is the ridge line where drainage flows into Range Creek. The northern boundary is Sunnyside Coal Mine property and to the south is the Lila Canyon Drainage. The CIA encompasses approximately 11,000 acres.

III. Scope of Mining

Coal mining is thought to have begun in the area in the late 1800's or early 1900's. Prior to this time, Horse Canyon was used as a cattle trail. In 1936, the Cedar Ridge Coal Company was formed and was operated until the takeover by the Defense Plant Corporation in 1942. U.S. Steel developed the site as it is today and operated the mine until 1982. Since Kaiser Coal's purchase of the property in 1984, no coal production has taken place in Horse Canyon. Some level of mining activity and mining disturbance has taken place in the area for nearly a century, with essentially the current level of disturbance having been in existence for 45 years. Eleven portals were used to facilitate the mine workings. All eleven portals have been sealed.

Mining has occurred on 3,519 acres in and adjacent to the permit area. U.S. Steel mined the lower Sunnyside coal bed. The room and pillar mining method followed by extensive retreat mining was employed. Currently, there is no active

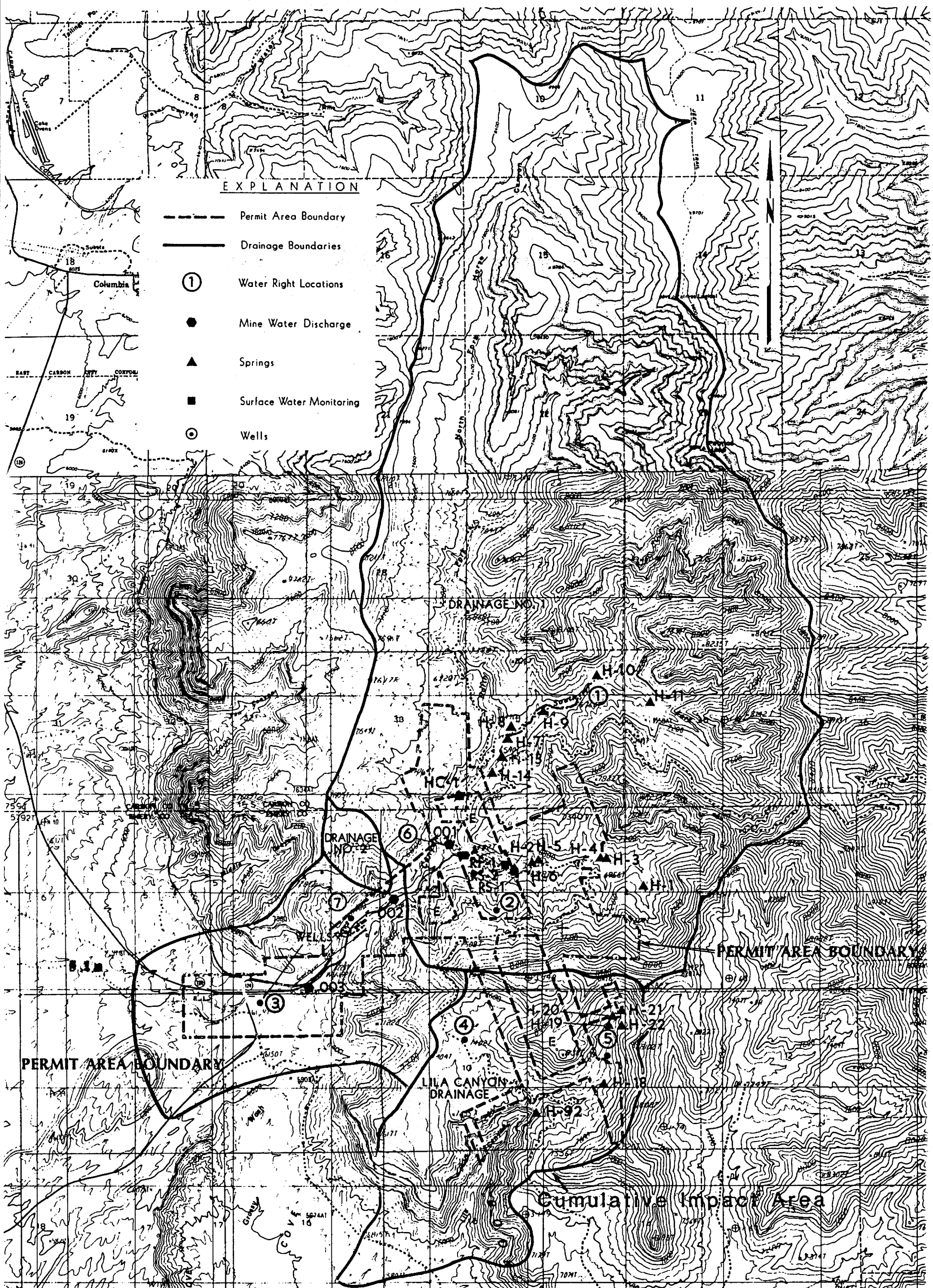


Figure 2. Cumulative Impact Area (CIA)

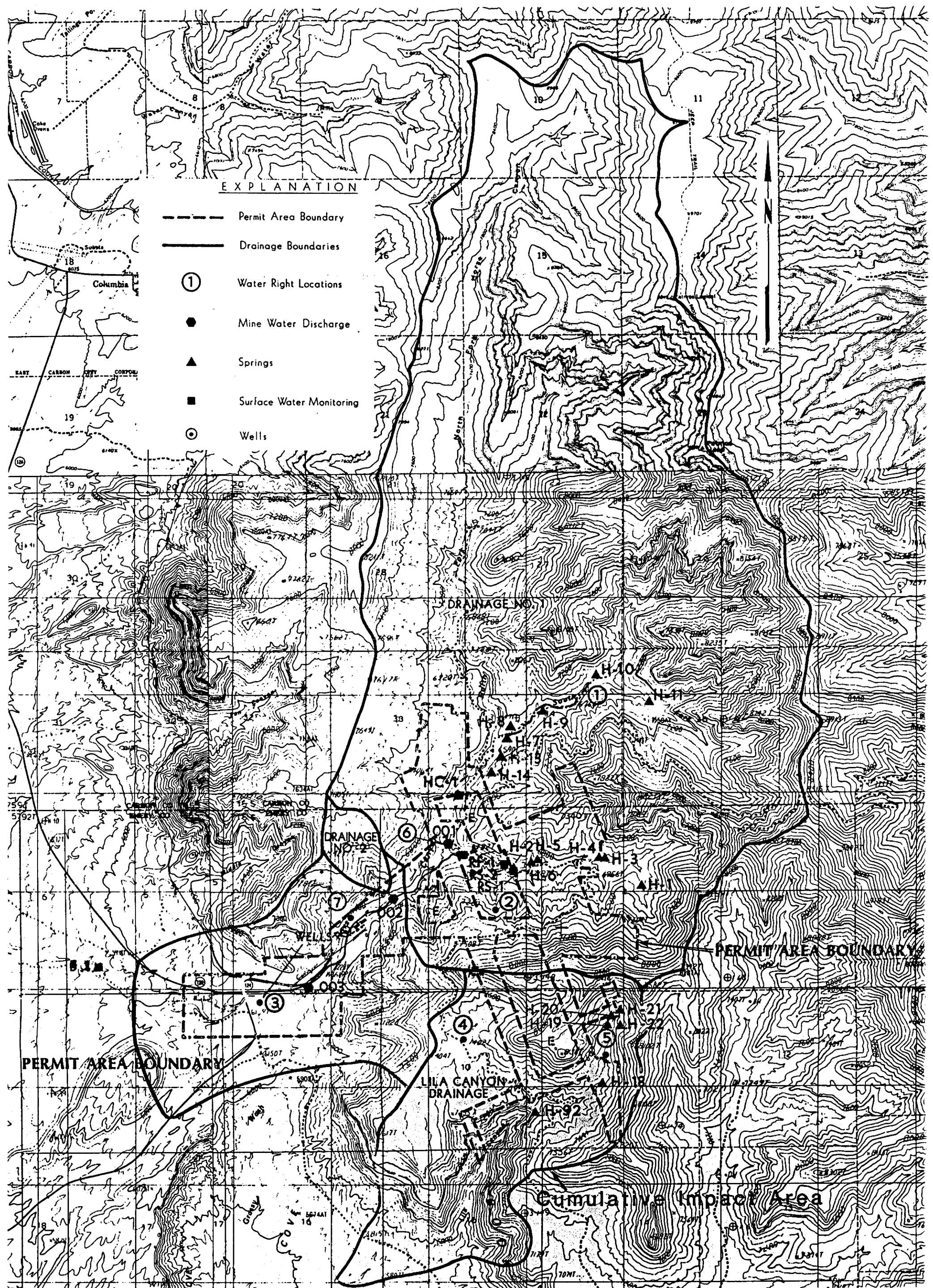


Figure 4. Location of Springs and Wells

mining at the Horse Canyon Mine; however, there is a possibility that mining will occur in the future.

IV. Study Area

A. Geology

The Horse Canyon Mines area is characterized by cliffs, narrow canyons, and pediments. Stratigraphic units outcropping within the area include, from oldest to youngest, the Mancos Shale, Blackhawk Formation, Castlegate Sandstone, Price River Formation, undifferentiated North Horn/Flagstaff Formation, Colton Formation, Green River Formation and Quaternary deposits. Lithologic descriptions and unit thicknesses are given in Figure 3.

The coal beds of economic importance in the Book Cliffs coal field are contained in the upper Cretaceous, Blackhawk Formation of the Mesaverde Group. In the Horse Canyon area, the Mesaverde Group consists of three formations, in ascending order, the Blackhawk Formation, Castlegate Sandstone, and the Price River Formation.

The Sunnyside Member of the Blackhawk Formation contains the primary economic coal resource of the Book Cliffs, and in the Horse Canyon area, the Sunnyside Sandstone contains two seams, the Upper Sunnyside and Lower Sunnyside seams. The Horse Canyon Mine is developed only in the Lower Sunnyside seam which maintains a thickness of 10 to over 16 feet throughout the mine area and probably a larger area to the northeast, east and south.

The Sunnyside seams outcrop along the Book Cliffs and in the Canyons which incise them. Locally, the seams are exposed at elevations ranging from 6,300 feet to 6,800 feet. The general strike of the beds in the mine area is N22°W dipping at 12 to 16 percent toward the east. There appear to be at least three sets of steeply dipping joints, one trending north to northwest about parallel to the strike of the beds, one trending west-northwest, and one trending northeast to east-northeast, about parallel to the dip of the beds (Osterwald, 1981).

B. Topography and Precipitation

Topography ranges from less than 5,800 feet to over 10,000 feet in the western and eastern portions of the CIA, respectively.

System	Series	Stratigraphic Unit	Thickness Feet	Description
Quaternary	Holocene	Quaternary deposits	Variable	Surficial stream terrace and channel, alluvial fan, landslide and talus and moraine deposits.
	Pleistocene	Green River Formation	100	Greenish-gray and white claystone and shale, also contains fine-grained and thin-bedded sandstone. Shales often dark brown containing carbonaceous matter. Full thickness not exposed.
Tertiary	Eocene	Colton Formation	250-1,000	Brown to dark red lenticular sandstone, shale and siltstone.
		Undifferentiated North Horn/Flagstaff Formation	1,200-1,800	Flagstaff consists of blue-gray to reddish-brown limestone. North Horn predominantly gray to gray-green calcareous and silty shale, tan to yellow-gray fine-grained sandstone and minor conglomerate.
Upper Cretaceous	Paleocene	Bluecastle Sandstone Member	500	Yellow-gray to white, medium-grained sandstone and shaley sandstone with gray to olive-green shale. Contains carbonaceous shale with minor coal.
		Lower Unnamed Member		
	Maestrichtian	Price River Formation	180	White to gray, fine- to medium-grained, argillaceous massive resistant sandstone with subordinate shale.
		Castlegate Sandstone		
	Campanian	Upper Mudstone Member	700	Cyclical littoral and lagoonal deposits. Littoral deposits mainly thick-bedded to massive cliff-forming yellow-gray fine- to medium-grained sandstone, individual beds separated by gray shale.
		Sunnyside Member		Lagoonal facies consist of thin- to thick-bedded yellow-gray sandstones, shaley sandstones, shale and coal. Coal beds form basis of Book Cliffs coal field.
	Santonian	Lower Mudstone Member	4,000	Gray marine shale, locally heavily charged with carbonaceous material, slightly calcareous and gypsiferous, nonresistant forming flat desert surface and rounded hills and badlands.
		Kenilworth Member		
	Coniacian	Aberdeen Member		
		Mancos Shale		

Figure 3. Stratigraphy of the Book Cliffs Coal Field (modified from Doelling 1972 and Osterwald et al 1981)

There is a strong north-south slope effect on vegetation because of the narrow canyons. North facing slopes are dominated by Douglas fir or mountainbrush communities while south-facing slopes are typically dominated by pinyon-juniper and salina wildrye. These vegetation types are intermixed with grassland vegetation at lower elevations.

No riparian vegetation as such has developed along Horse Creek. Rabbitbrush and other shrub are somewhat denser in this area.

V. Hydrologic Resources

A. Ground Water

The groundwater regime within the CIA is dependent upon climactic and geologic parameters that establish systems of recharge, movement and discharge.

In the deeply incised mountainous areas of the Book Cliffs, groundwater is present in consolidated bedrock, in both a regional aquifer and isolated perched aquifers. Associated with the bedrock aquifers is groundwater fractures. Minor amounts of groundwater is found in shallow alluvial deposits at the bottom of the larger drainages.

Snowmelt at higher elevations provides most of the groundwater recharge, particularly where permeable lithologies such as fractured or solution limestone are exposed at the surface. Vertical migration of groundwater occurs through permeable rock units and/or along zones of faulting and fracturing. Lateral migration initiates when groundwater encounters impermeable rocks and continues until either the land surface is intersected (and spring discharge occurs) or other permeable lithologies or zones are encountered that allow further vertical flow.

Although unconfirmed locally, it is believed that the groundwater flow direction in the regional aquifer follows the structural dip in the Horse Canyon section of the Book Cliffs. Another dominant control of groundwater flow direction and magnitude is fractures, which are caused by faulting and other structural forces.

Groundwater resources in the permit area are limited due to the small surface area and low recharge rates. There is not enough base flow from groundwater discharge to maintain a perennial flow in Horse Canyon Creek.

The local recharge and discharge areas for perched aquifers (North Horn Formation and stratigraphically above) generally lie within the drainage divide of Horse and Lila Canyons. These local systems are complex and highly dependent on topography. The regional aquifer (Castlegate and Blackhawk formations) probably has a groundwater divide which lies somewhat west of the drainage divide between Horse Canyon drainage and Range Creek drainage, and between Lila Canyon drainage and Little Park drainage.

Aerially small, alluvium aquifers contain a small amount of groundwater in the area. Two wells are located within the alluvium of lower Horse Canyon Creek. The location of these wells is shown on Figure 4.

A visual inspection of the area showed no diminution of reasonably foreseeable use of aquifers. Since mining ceased in 1983 and subsidence should have occurred within two years, no deterioration of the aquifers should occur due to material damage by subsidence in the future.

Lines and Plantz (1981, page 33) conducted three seepage surveys of Horse Canyon Creek in 1978 and 1979. The results of the surveys show no consistent trends through time. Mine discharges create difficulties in interpretation of the data because there is no indication of whether the mine was or was not discharging water at the time of the surveys. A 1985 study showed that no springs or seeps were located within the disturbed area, near the surface facilities. Within and adjacent to the permit area, 19 springs and seeps were found. The flow rates from the springs varied from less than 1 gpm to about 10 gpm.

Based on the data, nine of the springs occurred from alluvial deposits in the stream channels or in colluvium. Nine of the remaining springs discharge from sandstone located above less permeable shale.

No springs on Figure 4 occur below the Price River Formation nor above the North Horn Formation. The fact that no springs occur in the Castlegate Sandstone or stratigraphically below, indicates these lower formations may be recharged by streams which flow over them. This also indicates the groundwater flow direction is similar to the structural dip direction in the regional aquifer.

According to mining records of U.S. Steel, the underground flows which issue from rock slopes and gob areas were small. Only when the mine intercepted the Sunnyside Fault was significant water encountered.

The rate of inflow into the mine is not precisely known. In U.S. Steel's Permit Application Package (PAP) (1983), they estimated the average discharge from the mine to be 0.2 cfs. Lines and Plantz (1981, page 32) also estimated the discharge from the mine at 0.2 cfs and mentioned that the discharge was intermittent. It is not known, however, if this represents a constant average flow or the average flow rate during discharge periods. The mine was using an unknown volume of water from the mine for dust suppression and other operational needs.

B. Surface Water

Surface waters in this part of the Book Cliffs drain to the Price River. The Price River flows to the Green River which, in turn, flows to the Colorado River.

The regional drainage patterns are generally north-south with steep canyons which are incised in the Book Cliffs escarpment. Stream flows within the region, generally, are the result of snowmelt runoff or summer thunderstorms. Perennial and intermittent streams along the Book Cliffs flow as a result of baseflow contribution from springs and seeps from the consolidated bedrock and/or from alluvial deposits in areas where the alluvium thins, due to areas confined by bedrock.

Within the permit area, the surface water resources consist of two main drainages: Horse Canyon Creek, an intermittent stream, and Lila Canyon Creek, an ephemeral drainage. These two flow to Iceland Wash which, in turn, flows to Grassy Trail Creek and the Price River.

Generally, Horse Canyon and Lila Canyon Creek flow during the spring snowmelt runoff period and also as a result of isolated summer thunderstorms. Due to the limited drainage area and elevation of Lila Canyon, the duration of the snowmelt flows is quite short and is limited to the very early spring. Flows in Horse Canyon, generally, are limited to the early spring period (Lines and Plantz, 1981). By late spring to early summer, usually no flow is evident in Horse Canyon Creek.

During most years, the snowmelt peak is the highest peak flow for drainages. Under certain circumstances, when a significant summer thunderstorm occurs over the drainages, the runoff event can be quite large.

C. Alluvial Valley Floors

For this site, the area available for either flood or sub-irrigation would be so limited, due to the limited annual water supply, that an economic agricultural farming

or ranching operation would not be feasible. The annual runoff from snowmelt does not support runoff in Horse Canyon Creek past the late spring. Thunderstorm runoff is not a reliable water source. Therefore, it would be possible to insure an adequate water supply.

VI. Potential Hydrologic Impacts

A. Ground Water

Mine Water There are several factors which indicate that the water level in the mine is highly unlikely to flood to the levels of the lowest portal (6,326 feet).

- 1) Mine water level information gathered in 1986 indicates that there has been little, if any, rise in the water level since mining activities ceased.
- 2) The Columbia Mine also encountered the Sunnyside Fault zone and has been closed since the late 1960's. If water inflow rates were high, the mine workings would have flooded, developing a head differential between the Columbia Mine and the Horse Canyon Mine (pumped). Water quality generally drops significantly when exposed to mine workings (gob, etc). The water quality of the mine water samples from the sump locations (2 Dip, Main Slope, 2E-B) as compared to the water quality of springs in the lower stratigraphic section of the permit area show little difference in TDS. This indicates that water in the mine is not the result of inflow along the fault zone from the Columbia Mine. Either the fault zone is a poor conductor of water or the Columbia Mine workings have not flooded much beyond the water levels in the Horse Canyon Mine while it was pumped.
- 3) There is evidence (presented in previous section) indicating that the regional groundwater flow direction is away from the portal openings (down structural dip).
- 4) The coal mined at Horse Canyon is underlain by a marine sheet sandstone which has the highest porosity and permeability in the Blackhawk formation. If the water level in the mine were to ever approach the level of the portal, the Sunnyside marine sandstone would likely discharge water, preventing any head development behind the portal closures.
- 5) Much of the Horse Canyon Mine floor has been fractured by the effects of pillar removal, especially near the outcrop. Fracturing develops secondary porosity

and enhances the permeability of the underlying Sunnyside marine sandstone. This would function as a means to dissipate any head which might otherwise develop on the portals.

6) There is a difference in elevation of about 500 feet between the lowest portal and the approximate water level in the mine (1986). If the water level in the mine continues to rise, the head differential between the discharging aquifer and the mine will decrease. This decrease in head will have the direct effect of decreasing the inflow rate into the mine. The volume of water required to "fill the mine" would also have to fill the aquifer porosity above the mine, which has been dewatered throughout the history of the mine.

Based on these factors, it is very unlikely that the groundwater level in the regional aquifer will ever rise to the level of the portal, at any portal location for the Horse Canyon Mine. Hence, there should be no natural discharge of groundwater through any of the sealed portals.

Springs and Seeps The conditions represented by existing spring and seep data reflects the impacts, if any, of 50 years of mining. It is unlikely that there will be any additional measurable impacts from the mining and reclamation activities at the mine. Existing springs in the area above the mine should continue to flow, showing fluctuations which are related to variations in recharge.

Subsidence presents a potential to alter the groundwater flow regime in the area. There are two factors which tend to limit the effects of subsidence on the groundwater regime. One, the springs which supply most of the local flow discharge from the North Horn Formation. This formation or aquifer is perched from the underlying regional aquifer and the formation contains swelling clays which tend to heal small fractures. Second, since the perched aquifer materials are lenticular, there is a greater probability that fractures in one area will not drain all the different perched aquifers because they are not interconnected.

Water flow which previously was pumped from the mine into Horse Canyon Creek has ceased. This water will now remain in the natural flow regime of the regional aquifer.

B. Surface Water

Within the permit area, the general seasonal streamflow is intermittent. The stream generally dries up by late spring with only occasional runoff during the summer resulting from rainfall events.

Because of the presence of large disturbed areas and the potential for large runoff events, the control of erosion is a prime factor in maintaining the hydrologic balance within the mine permit area.

The contamination, diminution, or interruption of any water resources would not likely occur within the mine permit area. Since surface water flows only a limited part of year and will be provided protection by use of sediment controls, the major usable water resources that could potentially be effected in the area would be springs that are currently in use by wildlife and livestock. Most of these springs are located upstream of the permit area or are in areas where subsidence resulting from post-1977 mining is not documented. To date, no known depletion of flow and quality of surveyed springs in the permit area exists. Therefore, it is unlikely an alternative water supply will be needed, although they have been identified in Section 6.4.

Based on the previous comparison of upstream and downstream data gathered on Horse Canyon Creek which incorporates the analysis from past mine discharges to the channel, water quality will not be drastically affected in the intermittent creek even in the unlikely event of natural discharge of mine water into the channel.

VII. Summary

The probable hydrologic impacts are summarized in this section. The primary factor in maintaining the hydrologic balance within the permit area is to control erosion in the 64 acres of disturbance. A schedule for upgrading drainage ditches and sediment control structures has been proposed by the applicant. All structures will be constructed according to methodologies and specifications in the Utah Coal Mining Rules. All construction and upgrading activities will be undertaken during periods of dry weather for both the mining and reclamation periods, it is expected that construction, upgrading or regrading activities would cause an increase in sediment load to Horse Creek.

Subsidence presents a potential to alter the groundwater flow regime in the area. The impact of subsidence to the groundwater from the last 50 years of mining is

Page 14
CHIA
ACT/007/013
May 6, 1991

unknown. Horse Canyon has not been mined since 1982. It is thought that most subsidence occurs within two years of mining. Therefore, any future effect of subsidence on groundwater should be negligible.

Mine water level information indicates that there has been no increase in water level since mining activities ceased in 1982. It is very unlikely that the groundwater level in the regional aquifer will ever rise to the level of the portal due to the direction of flow of the regional groundwater and the geologic stratigraphy. Hence, there should be no natural discharge of groundwater through any of the sealed portals.

The operational and reclamation design proposed for the Horse Canyon Mine is herein determined to be consistent with preventing damage to the hydrologic balance outside the mine plan area.

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Page 15
CHIA
ACT/007/013
May 6, 1991

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